In the Claims

1. (original) An echo detector having: a correlator for determining a correlation between an incoming signal an echo signal having an echo of the incoming signal, and a preprocesssor for extracting a characteristic pattern from the incoming signal and a characteristic pattern from the echo signal, the correlation being determined by correlating the characteristic patterns, and the detector being arranged to detect the echo from peaks in the correlation.

2. (original) The detector of claim 1, the characteristic patterns being based on a quantised average of the respective signal or its power.

3. (original) The detector of claim 2, the quantisation being binary, using a threshold.

4. (original) The detector of claim 1, having a downsampler fordownsampling the characteristic patterns before the correlation.

5. (original) The detector of claim 1, arranged to determine a delay of the echo from the correlation.

6. (original) The detector of claim 1, the correlator being arranged to carry out the correlation recursively, using results obtained for preceding correlation values for determining a current correlation value.

7. (original) The detector of claim 1, the correlator being arranged to derive a current correlation component by correlating a current sample value of the characteristic pattern of the echo signal and a window of samples of the characteristic pattern of the incoming signal.

8. (original) The detector of claim 1, the characteristic patterns being based on zero crossings of the respective signal.

9. (currently amended) The detector of claim 1, the characteristic patterns ~~are~~ being based on auto correlation functions of the respective signal.

10. (original) The detector of claim 1, the characteristic patterns being based on pitch.

11. (original) An adaptive echo canceller having the detector of claim 1, the canceller being adaptable or suppressed according to an output of the detector.

12. (original) The canceller of claim 11 and arranged to adapt depending on an output of the echo detector.

13. (original) The canceller of claim 11 having an adaptable range of echo delay, the range being adaptable depending on an output of the echo detector.

14. (original) The canceller of claim 11 in the form of software.

15. (original) The detector of claim 1 in the form of software.

16. (original) Central office apparatus having the canceller of claim 11.

17. (original) A method of providing a telecommunications service to subscribers, over a network, and using the central office apparatus of claim 16.

18. (original) An echo detector having a coarse echo delay estimator and a fine echo detector, each arranged to detect echoes having delays within a given range, the range of the coarse detector being wider than the range of the fine detector, the range of the fine detector being adjustable according to an echo delay determined by the coarse echo delay estimator.

19. (original) The detector of claim 18, a centre of the range of the fine detector being adjustable.

20. (original) The detector of claim 18, the coarse echo delay estimator having a correlator for determining a correlation between an incoming signal an echo signal having an echo of the incoming signal, and a preprocesssor for extracting a characteristic pattern from the incoming signal and a characteristic pattern from the echo signal, the correlation being determined by correlating the extracted characteristic patterns, and the detector being arranged to detect the echo from peaks in the correlation.

21. (original) The detector of claim 18, the characteristic pattern being based on a quantised average of the signal or its power.

22. (original) The detector of claim 18, arranged such that a delay value output by the coarse echo delay estimator is compared to a current range of the fine echo detector, and arranged to confirm an echo detection output of the fine echo detector using the result of the comparison.

23. (original) An adaptive echo canceller having a detector as set out in claim 18, and arranged to adapt or suppress a cancellation action on the basis of an output of the coarse echo delay estimator.

24. (original) The canceller of claim 23, having a filter for filtering the incoming signal to model the echo, a centre of a window of the filter being adjustable on the basis of an output of the coarse echo delay estimator.

25. (original) The canceller of claim 24, the centre of the window being adjustable by providing an adjustable delay for delaying the incoming signal before it is input to the filter.

26. (original) The detector of claim 18 in the form of software.

27. (original) A method of producing echo cancelled signals by the steps of: estimating a delay of the echo using a coarse echo delay estimator, arranged to detect a given range of delays, using the estimated delay to adjust a range of a fine delay detector, detecting a delay of the echo using the fine echo delay detector, arranged to detect a narrower range of delays, and using the output of the

fine delay detector, to adjust or suppress an adaptive echo canceller, to produce echo cancelled signals.